



An integrated modelling framework for simulating regional-scale actor responses to global change in the water domain

Author(s): Barthel R, Janisch S, Schwarz N, Trifkovic A, Nickel D, Schulz C, Mauser W
Year: 2008
Journal: Environmental Modelling & Software : With Environment Data News. 23 (9): 1095-1121

Abstract:

Within coupled hydrological simulation systems, taking socio-economic processes into account is still a challenging task. In particular, systems that aim at evaluating impacts of climatic change on large spatial and temporal scales cannot be based on the assumption that infrastructure, economy, demography and other human factors remain constant while physical boundary conditions change. Therefore, any meaningful simulation of possible future scenarios needs to enable socio-economic systems to react and to adapt to climatic changes. To achieve this it is necessary to simulate decision-making processes of the relevant actors in a way which is adequate for the scale, the catchment specific management problems to be investigated and finally the data availability. This contribution presents the DeepActor approach for representing such human decision processes, which makes use of a multi-actor simulation framework and has similarities to agent-based approaches. This DeepActor approach is embedded in Danubia, a coupled simulation system comprising 16 individual models to simulate Global Change impacts on the entire water cycle of the Upper Danube Catchment (Germany, 77,000 km²). The applicability of Danubia and in particular the DeepActor approach for treating the socio-economic part of the water cycle in a process-based way is demonstrated by means of concrete simulation models of the water supply sector and of the domestic water users. Results from scenario simulations are used to demonstrate the capabilities and limitations of the approach.

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

Special Report on Emissions Scenarios (SRES) Scenario: SRES B2

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change;
 surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Climate Change and Human Health Literature Portal

Communication Audience: ☒

audience to whom the resource is directed

Researcher

Exposure : ☒

weather or climate related pathway by which climate change affects health

Food/Water Security

Geographic Feature: ☒

resource focuses on specific type of geography

Freshwater

Geographic Location: ☒

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Region, European Country

Other European Region: The Upper Danube Basin

Other European Country : Czech Republic;Austria;Italy;Switzerland;Germany

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

Cost/Economic, Exposure Change Prediction

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content